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(54) A sports ground

(57) A sports ground (1) has a playing surface provided by a top layer (a) of sand. The sand is kept moist in dry weather by delivery of water from reservoirs (20) and distribution pipes (4 and 5). The water moves up through the sand by capillary action. During wet weather the distribution pipes (4, 5) act as drainage pipes for delivery of water into the reservoirs (20) and overspilling into a peripheral drain (30).

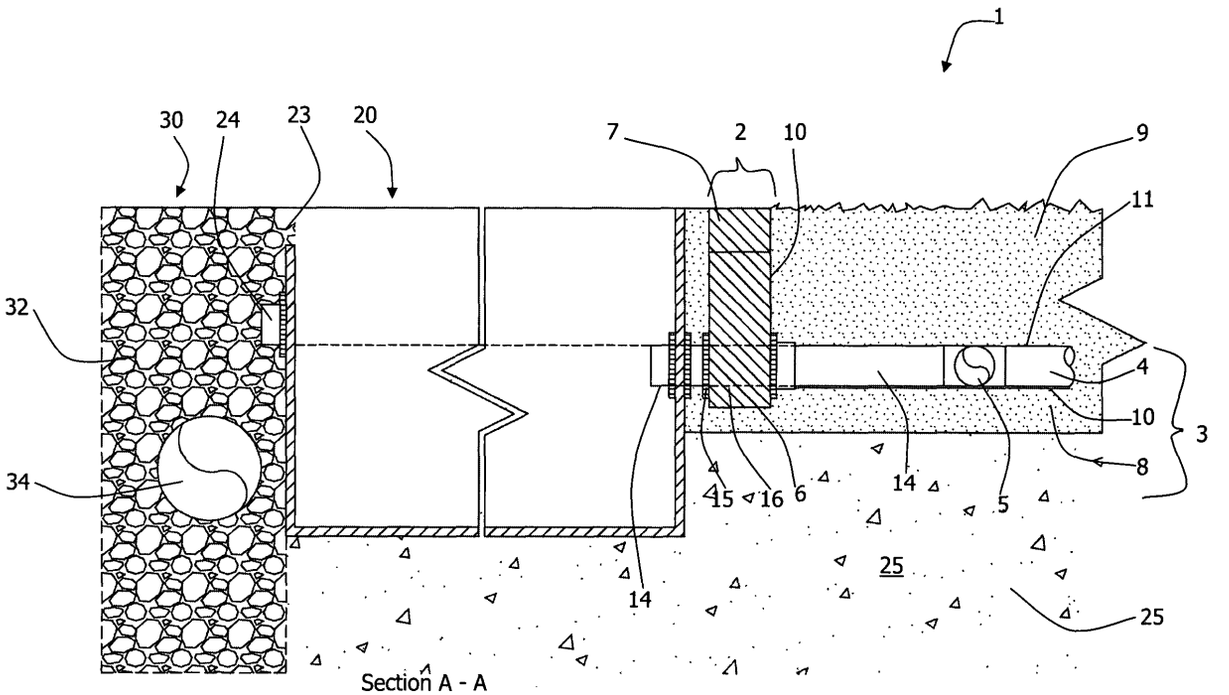

Fig.1

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Description

Introduction

[0001] The invention relates to sports grounds.

[0002] It can be difficult to maintain the surface quality of grass pitches and sports fields particularly in the winter months, and if they are frequently in use for training sessions as well as competitions. There is a need for a hard wearing sports training ground that can be used at all times of year. One current approach is to provide synthetic sports grounds infilled with a fine rubber crumb however, such grounds are often of variable quality and expensive to install. In another approach, a layer of fine sand is provided over a gravel layer. However, such an arrangement often has the disadvantages of being dusty during dry periods, and of having an inconsistent surface due to the mixing of gravel to the surface with heavy wear. In another approach fine angular sand is mixed with rubber crumb and a textile thread-like material and this mixture is then sprayed with a wax or petroleum jelly-like substance to reduce surface dust. This type of surface is expensive and requires high levels of expensive maintenance. Furthermore, all weather sports training grounds often have hard surfaces which lead to injury, and poor drainage often leading to flooding of the surface.

[0003] The invention addresses these problems.

Statements of Invention

[0004] According to the invention, there is provided a sports ground system comprising:

a surface layer of sand; and
a water management system for maintaining the sand moist.

[0005] In one embodiment, water is delivered to the sand layer by means of capillary action.

[0006] In another embodiment, the water management system comprises a plurality of distributed pipes laid underneath the sand layer.

[0007] In a further embodiment, the water management system comprises means for delivering water to and draining water from, the sand layer.

[0008] In one embodiment, the distributed pipes are perforated to enable delivery or drainage of water from the sand layer.

[0009] In another embodiment, an impermeable membrane is laid underneath the sand layer and pipes to ensure that moisture flows upwards into said sand layer.

[0010] In a further embodiment, the composition of the sand layer is such that the water provided at the base of the layer is drawn up through the sand layer.

[0011] In one embodiment, the sand layer is comprised of grains of sand of substantially uniform size and shape.

[0012] In another embodiment, the sand layer is comprised of grains of sand having a substantially spherical form.

[0013] In a further embodiment, the sand layer is comprised of grains of sand mainly in the size range of 0.05 - 1mm in diameter, preferably the sand layer is comprised of grains of sand mainly in the size range of 0.125 - 0.5mm in diameter.

[0014] In one embodiment, the surface layer of sand is deposited to a depth of 150mm - 350mm, most preferably the surface layer of sand is deposited to a depth of 250mm - 300mm.

[0015] In another embodiment, the water management system further comprises a water reservoir connected to a water supply and to the distributed pipes and to enable supply of water to the sand layer.

[0016] In a further embodiment, the water reservoir is connected to the distributed pipes by a feed pipe.

[0017] In one embodiment, the water management system further comprises a drainage system connected to the reservoir, wherein the distributed pipes, feed pipe, and reservoir are configured to allow the reverse flow of water from the sand layer to the drainage system.

[0018] In another embodiment, the reservoir is connected to the drainage system by means of an outflow pipe and overflow pipe.

[0019] In a further embodiment, the overflow pipe is arranged at a higher level than the outflow pipe which is at a higher level than the feed pipe.

[0020] In one embodiment, the water reservoir comprises a water level control means for controlling the water level in the reservoir relative to the levels of the overflow, outflow and feed pipes.

[0021] In another embodiment, the water level is controlled at the outflow pipe level to maintain a constant level of water in the feed and distributed pipes and to deliver a constant supply of water to the sand layer.

[0022] In a further embodiment, the water level in the reservoir is controlled at the overflow level to increase the amount of water delivered to the sand layer.

[0023] In one embodiment, the water management system is laid below the surface level of the ground.

[0024] In another embodiment, the system further comprises a perimeter frame and wherein the surface layer and the pipes are laid within the perimeter frame and wherein the impermeable membrane is laid over the perimeter frame.

[0025] In a further embodiment, the system further comprises a base layer under the impermeable membrane, wherein the base layer is of fine sand having a depth of 30mm to 50mm.

[0026] In one embodiment, the impermeable membrane is of a plastics material or a polymer material.

[0027] In another embodiment, the distributed pipes are covered with a permeable membrane to prevent sand grains from entering the pipes, preferably the permeable membrane comprises a geo-textile material.

[0028] In a further embodiment, the system comprises the steps of:

excavating the site,

laying the perimeter frame and base layer,

covering the base layer with an impermeable membrane,

installing the drainage system,

laying the distribution pipes,

installing the reservoir,

connecting the water supply pipe to the distribution pipes,

depositing the surface layer of sand,

irrigating the sand, and

finishing off the levels of gravel in the drainage trench and sand of the surface layer.

Detailed Description of the Invention

[0029] The invention will be more clearly understood from the following description of some embodiments thereof, given by way of example only with reference to the accompanying drawings in which:-

Fig. 1 is a cross-sectional side view illustrating the below surface structure of a portion of a sports ground of the invention;

Fig. 2 is an plan view from above of the layout of a portion of the sports ground; and

Fig. 3 is a cut away plan view illustrating layout of a sports ground of the invention.

[0030] Referring to Figs. 1 and 2, a sports ground 1 comprises a surface layer 9 of sand, a perimeter frame 2, and a water distribution system 3. The water distribution system 3 comprises distribution pipes 4, connected by a feed pipe 14 to a water reservoir tank 20. The reservoir 20 is in turn connected by an overflow 23 and outflow pipe 24 to a drain 30 having a land drainage pipe 34. Sets of adjacent pipes 4 are connected by a connector pipe 5.

[0031] The water distribution system 3 is designed and set-up to maintain the required levels of moisture in the layer of sand 9. The water distribution system serves both to irrigate the layer 9 during dry periods, and to drain it during wet periods.

[0032] The perimeter frame 2 and the water distribution system 3 are installed below ground surface level in an excavated site. When the perimeter frame 2 is installed, a base layer 8 of approximately 30-50mm of fine sand is laid over compacted soil 25 of the excavated site. The base layer 8 and the perimeter frame 2 are covered with an impermeable membrane 10. The water distribution pipes 4 and connector pipes 5 are laid onto the impermeable membrane 10, and the surface layer 9 of sand is added, inside the perimeter frame 2. The reservoir 20 and the drain 30 are installed outside the perimeter frame 2.

[0033] The perimeter frame 2 is comprised of timber planks 6. The timber planks 6 are laid end to end and supported by a stake 19 which may be made from timber or mild steel. The planks 6 are treated with a high pressure creosote. A typical plank 6 has dimensions of 225mm x 75mm x 4000mm, however, timber planks of any suitable construction or size may be used. The membrane 10 is placed over the timber planks 6 and the base layer 8 and tacked with laths to the outside of the planks. It is secured in place by timber battens 7 which are nailed using galvanised nails or brass screws onto the planks 6 over the membrane 10. A typical batten 7 has dimensions of 75mm x 50mm x 4000mm. The battens 7 are placed over that part of the membrane nearest to the surface to protect the membrane 10 from damage from above. Other suitable means are for example, an adhesive or securing pins could be used to hold the membrane in place.

[0034] The impermeable membrane 10 is manufactured of a plastics or polymer material. Suitable materials include for example, polypropylene or polyethylene or polyvinyl chloride. The impermeable membrane 10 has a thickness of 0.5mm or more. However, suitable membranes may have a different thickness for example, in the range of 0.1mm or more.

[0035] The pipes 4 are perforated and covered with a water permeable membrane 11. The permeable membrane 11 may be of any suitable material, for example, a geotextile material. The permeable membrane 11 is used to prevent fine material or very fine grains of sand from getting into or being washed onto the pipes with heavy rain.

[0036] The pipes 4 and 5 are laid directly onto the impermeable membrane 10. In the present embodiment, as shown in Fig. 3, the distribution pipes 4 are laid in sets of five parallel pipes 4, which run across the width of the sports ground 1. The pipes 4 are anchored in place by the weight of the sand and, if required by means of anchors (not shown). The anchors are placed under the pipes at 5 metre intervals and are held in position by the weight of sand or by gluing them to the membrane 10. They are secured to the pipes 4 by means of plastic or wire ties. The plastic anchors may be of any suitable shape or size for example, 250mm square or a 250mm disc. Depending on the size of the sports ground 1 and the manner in which they are laid the length of the pipes 4 may range from a few metres to more than 100 metres.

[0037] One end of each pipe 4 is connected to a connector pipe 5 and a stopper is installed in the other end.

[0038] The pipes 5 are installed at right angles to the pipes 4 approximately 200mm inside the edge of the frame 2. The pipes 5 are joined to the reservoir 20 outside, through the membrane 10 and the perimeter frame 2, by a threaded rigid 50mm steel or rigid plastic feed pipe 14. The pipes 4, 5 and 14 serve to supply water to the ground 1 when needed and to drain it away when it rains. The feed pipe 14 is secured to the reservoir 20 and the timber laths 6 using nuts 15 and flanges 16 to make sure no leaks occur. Alternatively the feed pipe may be secured to the tank 20 through the timber lath 6 at a height of 25mm above the base of the pitch to facilitate the tightening of the nuts 15. The connector pipe 5 is also of rigid material. The pipes 4, 5 and 14 are all 50mm pipes.

[0039] The water storage and drainage mechanisms are described in more detail with reference to Fig. 1. The reservoir 20 is located between the distributed pipes 4 and 5 and the drainage system 30. The reservoir 20 is connected to the drain 80 by an overflow pipe 23 and an outflow pipe 24, and to the distributed pipes 4 and 5 by means of the feed pipe 14. The tank is also connected to a water supply by means of a supply pipe 44 which has a ballcock (not shown) fitted. The outflow pipe 24 is located on the opposite side of the tank from the feed pipe 14 and at a higher level, typically 50mm above it. The outflow pipe 24 projects into the drainage trench 30 and has a stopcock (not shown) fitted. This stopcock is normally open allowing the water in the tank 20 to fill up to the level of the pipe 24 which ensures that the water levels in the feed pipe 14, the distributed pipes 4 and 5 and at the base of the sand layer 9 are maintained. If the stopcock on the outflow is closed then the water level fills to the level of the overflow pipe 23, which is above the outflow pipe 24, and the water level at the base of the sand column also rises.

[0040] Reservoirs tanks 20 are installed at intervals along the side of, and in proximity to, or touching, the perimeter frame 2 of the pitch. The reservoirs 20 are set into ground so that their tops are level with the final pitch level. They are then covered with rigid lids to protect them. The tanks are manufactured of a plastics material, for example a rigid polyvinyl chloride. The tanks typically have a capacity of 100 to 200 litres and dimensions of 500mm x 750mm x 500mm. As illustrated in Fig. 2 and 3 in the present embodiment, each tank 20 serves a 10 metre width across the ground 1. Thus 9 tanks are required for a sports ground of 90 metres in length.

[0041] A land drainage pipe 34 runs the length of the drainage trench 30 and leads into a storm drain or other suitable outfall. The drain trench is which is filled with gravel 32. The land drainage pipe 34 is a 150mm perforated pipe. The trench 30 and drainage pipe 34 are installed at a gradient to assist drainage.

[0042] The system of the invention is based on the principle of capillary action. The layer 9 of sand is comprised of grains of a specific shape and size which when placed on a wet surface to a depth of approximately 250mm - 300mm draw water up through the column of sand by capillary action. This water stabilises the sand.

[0043] The sand grains of the layer of sand 9 of the sports ground are substantially round and uniform in size. Seventy-five per cent of the grains should be in the size range of 0.125 - 0.5mm in diameter, with not more than ten percent overall below the 0.125mm diameter size and not more than six per cent above the 1mm diameter size. Fifteen per cent may be in the 0.5 - 1mm size range. Rounded sand grains of such specification are used to facilitate capillary action. The sand column 9 draws water up and also allows excellent drainage.

[0044] The sand in the layer 9 is spread to a depth of approximately 250mm -300mm on a level surface over the impermeable membrane 10, and the grid system of 50mm perforated pipes 4 and connector pipes 5. The pipes 4 are spaced in such a way as to allow a constant water supply at the base of the sand column on the impermeable membrane thus maintaining capillary action within the sand profile and keeping the sand moist but firm.

[0045] While the sand grains of the size used in the present embodiment are noted in practice to provide particularly good results when spread to the depth specified, it will be appreciated the composition of the sand layer and/or the size of particles and/or the depth of the layer may be varied in practice. For example, it will be appreciated that sand grains in the size range of approximately 0.05 -1mm in diameter may be used. Also the sand layer may for example be laid to a depth in the range of 100mm to 500mm. The size of grains and depth of layer being selected to produce the required effect of the invention.

[0046] This same design also allows reverse flows to occur to drain the sand layer. When it rains the entire construction acts as a joint drain thus maintaining the integrity of the profile of the surface layer 9 of sports ground.

[0047] Referring to Fig. 3, the sports ground 1 has dimensions 90m x 60m. The relative locations of the reservoirs 20, pipes 4, 5, 14, 24, 34, 44, pitch perimeter frame 2 and the drainage trench 30 are as illustrated in Figs. 1 and 2. The dimensions of the ground may vary as required from a few square metres to a number of hectares.

[0048] The steps involved in constructing a sports ground of the invention are as follows:

Steps 1 and 2. The site is prepared.

Steps 3 to 13. The sports ground is installed. This involves laying the perimeter 2, base layer 8, membrane 10, pipes 4, 5, 14, 24, 34 and 44, reservoirs 20, and drains 30. When the plumbing is finished the surface layer of sand 9 is laid and the edges of the sports ground 1 finished.

[0049] Step 1. The site is cleared, all long grass is cut and disposed of and all extraneous material removed.

[0050] Step 2. The site is excavated. An area sufficiently large to accommodate the training surface, drains, banks and pathways is excavated. The area is graded by a cut and fill procedure to form a firm and smooth level surface which allows enough soil around the perimeter of the site to create a gentle slope up to the finished construction. Where filling is required excavated material is deposited in layers not exceeding 150mm and consolidated well to eliminate settlement. The whole area required for the sports ground 1 is compacted using excavator tracks to a uniform degree of firmness with a tolerance to the level of plus or minus 30mm.

[0051] Steps 3 - 13. The sports ground is installed.

[0052] Step 3. The perimeter frame 2 is laid. The timber planks 6 are laid on their edge around the perimeter, the planks are kept in place by use of stakes 19 that are driven into the ground at each point where planks are joined. The stakes 19 have dimensions of the order of 150mm x 75mm x 2500mm if timber, or 12mm - 15mm diameter x 2500mm long mild steel which should be galvanised. The timber perimeter must be substantially level.

[0053] Step 4. Sand is now spread over the compacted soil to a depth of 30mm and levelled to form a base layer 8. Rabbit sand or some other very fine sand may be used.

[0054] Step 5. The impermeable membrane 10 is laid over the base 8 and frame 2 and tacked with laths to the outside of the timber planks 6 of the frame. The membrane 10 is secured in place by timber battens 7 which are fixed onto the planks 6 over the membrane 10 using galvanised or brass nails or screws.

[0055] Step 6. The next stage of construction is installation of a piped drainage trench 30. The piped drain is installed on the side of the pitch where the reservoirs 20 are to be installed.

[0056] The drainage trench 30 runs the entire length of the pitch. It has dimensions of 800mm deep by 500mm wide at one end of the pitch, and 1000mm deep by 500mm wide at the other end of the pitch, this allows a fall of 200mm over the 90m length of the pitch. This trench 30 should be at a separation of approximately 750mm from the frame 2 of the pitch. 10mm of pea gravel 32 is inserted to a depth of 50mm and a 150mm perforated land drainage pipe 34 is inserted on top of the gravel 32 in the middle of the trench 30 which is filled with the same pea gravel up to within 200mm of the surface. The land drain pipe 34 extends from the trench 30 into a suitable outfall or storm drain.

[0057] Step 7. The reservoirs 20 are installed at 10m intervals along the length of the field. Each reservoir tank 20 is installed on a bed of concrete 26 at a depth which ensures that the top of the tank is level with the top of the frame 2 at the side of the pitch. The reservoirs 20 are installed at 10m intervals along the side of and touching the frame 2 of the pitch.

[0058] Each reservoir tank 20 is fed by a 20mm plastic supply pipe 44 through a ballcock, and each serves a set of five parallel 50mm pipes 4 which run across the pitch at 2m intervals.

[0059] Step 8. The water distribution pipes 4 are laid. The distribution pipes 4 are laid at 2 metre intervals along the length of the pitch. The pipes 4 run across the width of the pitch. The ends of the five parallel pipes 4 of each set are connected at right angles to the connector pipe 5. All of the pipes 4 and 5 are laid directly on to the impermeable membrane 10. The distribution pipes 4 are anchored to keep them in place.

[0060] Step 9. The drainage trench 30 is topped up to make it level with the ground surface with the same gravel 32. Any excess soil which was left around the perimeter at the beginning in now pushed in against the perimeter frame 2 of the pitch to form a permanent support and ramp. The side of the pitch where the sand is to be drawn onto the pitch will be left free of soil until all the sand is installed and then should be finished like the rest.

[0061] Step 10. Following the plumbing, the sand layer 9 is deposited. The sand is filled and spread onto the pitch using a tracked dumper, or other suitable means. First of all, a ramp of sand is formed at one of the sides of the sports ground. Then, sand is moved onto the pitch over the ramp. The sand is always moved in a forward direction to ensure that all traffic runs over sand rather then on the membrane directly. The sand is filled onto the pitch until it is about 20mm proud of the top.

[0062] Step 11. When the sand is filled to a level 20mm over the top of the ground, the water is turned on. During this initial stage of irrigating the ground, the tanks are allowed fill up to the level of the overflow pipe 23 by closing the stopcocks on the outflow pipes 24. To hurry up the irrigation process a surfactant may be added to enhance the wetting process.

[0063] Step 12. When the deposited sand is wet and settled, the layer 9 is filled up to the finished level by the addition of more sand if required. At this stage, the water level in the tanks may be reduced down to its normal level i.e. below the outflow pipe 24. A level of 50mm of water is maintained at the base of the sand column.

[0064] Step 13. The sides of the pitch are finished.

[0065] It is advisable to have concrete pathways leading up to the pitch for the entry and exit of players and for maintenance equipment so as to cut down on any possible contamination of the sand layer.

[0066] Although the initial irrigation takes a considerable period of time, when completed, less water is required to maintain moisture in the sports ground thereafter. In fact, in general normal rainfall provides the vast bulk of water requirements over the lifetime of the pitch.

[0067] The levels of moisture in the sports ground can be varied if required. As noted above (step 11) if the stopcock on the outflow pipe 24 is closed then the water level in the tank 20 will rise to a higher level at the base

of the overflow pipe 23. As a result the saturated level of water in the sand 9 also rises. This increased saturation has the effect of making the surface of the sand 9 more stable than at the normal levels of saturation and more suitable for use for example, as a car park.

[0068] The surface of the sand when stabilised by water is sufficiently hard wearing to allow activities take place that would never be possible on dry sand. It also has the advantages that it is very user friendly, since it is not dusty, and sand is not raised from the surface during use. It also provides a consistent, reliable, even surface and yielding surface. The present system also has the advantages that it is robust and hard wearing. The membrane ensures that there is no contamination of material from underneath the sand layer and even if there is serious disturbance at the surface due to heavy wear there is no mixing as all the sand is the same.

[0069] The surface of the sports ground of the invention is designed to withstand heavy wear in all weather and is suitable for all sports where training activity is such that grass surfaced areas are unable to withstand the heavy use. It is particularly useful for sports in the wintertime when other types of surfaces are unable to withstand the intensity of the training programmes. It is suitable for all kinds of sporting activities including equestrian activities like lunging rings, jumping arenas and indoor training areas where a consistently firm though yielding surface is required and where dust or blowing sand might otherwise be a problem.

[0070] Frost does not damage the pitch in any way, but sometimes a frozen surface may be unacceptable for example for equestrian activities. Frost protection is achieved by the addition of granular salt to the surface. Salt can be added using a spinner. The spinner may for example, be mounted behind a quad or other vehicle. A pedestrian spinner would also be suitable as only a small amount of salt is needed and it will stay effective for quite a while depending on the rainfall.

[0071] The present system is economical to install and maintain. No expensive synthetic materials for example, rubber crumb or shredded textiles are required for filling. All of the raw materials are readily available. The system can be installed and ready for use in a short period of time.

[0072] It is envisaged that materials of dimensions different to those described would also be suitable for use in constructing a sports ground of the invention, in particular different types of planks, tanks, pipes and connectors could be used. Alternative spacings of reservoirs and pipes may be used. The perimeter could be comprised of a material other than wood. In some instances a complete perimeter may not be required.

[0073] It will be appreciated that the proportions of grains of sand a particular dimensions or the depths of the particular layers detailed in the embodiment described may be varied.

[0074] While the embodiments described relate to sport training grounds use of the ground system is not limited to sports, the ground may be used for alternative activities.

[0075] The invention is not limited to the embodiments described but may be varied in construction and detail.

Claims

1. A sports ground system comprising:

   a surface layer of sand (9); and

   a water management system (3) for maintaining the sand moist.

2. A sports ground system as claimed in claim 1, wherein water is delivered to the sand layer (9) by means of capillary action.

3. A sports ground system as claimed in claims 1 or 2, wherein the water management system (3) comprises a plurality of distributed pipes (4 and 5) laid underneath the sand layer (9).

4. A sports ground system as claimed in any preceding claim, wherein the water management system (3) comprises means for delivering water to and draining water from, the sand layer (9).

5. A sports ground system as claimed in claim 4, wherein the distributed pipes (4) are perforated to enable delivery or drainage of water from the sand layer (9).

6. A sports ground system as claimed in any preceding claim, wherein an impermeable membrane (10) is laid underneath the sand layer (9) and pipes (4 and 5) to ensure that moisture flows upwards into said sand layer (9).

7. A sports ground system as claimed in any preceding claim wherein the composition of the sand layer is such that the water provided at the base of the layer is drawn up through the sand layer (9).

8. A sports ground system as claimed in any preceding claim wherein the sand layer (9) is comprised of grains of sand of substantially uniform size and shape.

9. A sports ground system as claimed in claim 8, wherein the sand layer (9) is comprised of grains of sand having a substantially spherical form.

10. A sports ground system as claimed in any preceding claim, wherein the sand layer (9) is comprised of grains of sand mainly in the size range of 0.05 - 1mm in diameter, preferably the sand layer is com-

prised of grains of sand mainly in the size range of 0.125-0.5mm in diameter.

11. A sports ground system as claimed in any preceding claim, wherein the surface layer of sand (9) is deposited to a depth of 150mm-350mm, most preferably the surface layer of sand (9) is deposited to a depth of 250mm-300mm.

12. A sports ground system as claimed in any preceding claim, wherein the water management system further comprises a water reservoir (20) connected to a water supply and to the distributed pipes (4) and to enable supply of water to the sand layer (9).

13. A sports ground system as claimed in claim 12, wherein the water reservoir is connected to the distributed pipes (4) by a feed pipe (14).

14. A sports ground system as claimed in any preceding claim, wherein the water management system further comprises a drainage system (30) connected to the reservoir, wherein the distributed pipes (4), feed pipe (14), and reservoir (20) are configured to allow the reverse flow of water from the sand layer to the drainage system.

15. A sports ground system as claimed in any preceding claim, wherein the reservoir (20) is connected to the drainage system by means of an outflow pipe (24) and overflow pipe (23).

16. A sports ground system as claimed in any preceding claim wherein the overflow pipe is arranged at a higher level than the outflow pipe which is at a higher level than the feed pipe.

17. A sports ground system as claimed in any preceding claim wherein the water reservoir (20) comprises a water level control means for controlling the water level in the reservoir relative to the levels of the overflow, outflow and feed pipes.

18. A sports ground system as claimed in claims 16 or 17 wherein the water level is controlled at the outflow pipe level to maintain a constant level of water in the feed and distributed pipes (14, 4) and to deliver a constant supply of water to the sand layer (9).

19. A sports ground system as claimed in any of claims 15 to 17 wherein the water level in the reservoir (20) is controlled at the overflow level to increase the amount of water delivered to the sand layer.

20. A sports ground system as claimed in any preceding claim, wherein the water management system (3) is laid below the surface level of the ground.

21. A sports ground system as claimed in any preceding claim, further comprising a perimeter frame (2) and wherein the surface layer (9) and the pipes (4, 5) are laid within the perimeter frame (2) and wherein the impermeable membrane is laid over the perimeter frame.

22. A sports ground system as claimed in any preceding claim further comprising a base layer (8) under the impermeable membrane, wherein the base layer is of fine sand having a depth of 30mm to 50mm.

23. A sports ground system as claimed in any preceding claim, wherein the impermeable membrane (10) is of a plastics material or a polymer material.

24. A sports ground system as claimed in any preceding claim, wherein the distributed pipes (4) are covered with a permeable membrane (11) to prevent sand grains from entering the pipes, preferably the permeable membrane (11) comprises a geo-textile material.

25. A method for constructing a sport ground system as claimed in any preceding claim comprising the steps of:

excavating the site,

laying the perimeter frame (2) and base layer (8),

covering the base layer (8) with an impermeable membrane (10),

installing the drainage system (30, 34),

laying the distribution pipes (4 and 5),

installing the reservoir (20),

connecting the water supply pipe (14) to the distribution pipes (4 and 5),

depositing the surface layer of sand,

irrigating the sand, and

finishing off the levels of gravel in the drainage trench (30) and sand of the surface layer (9).

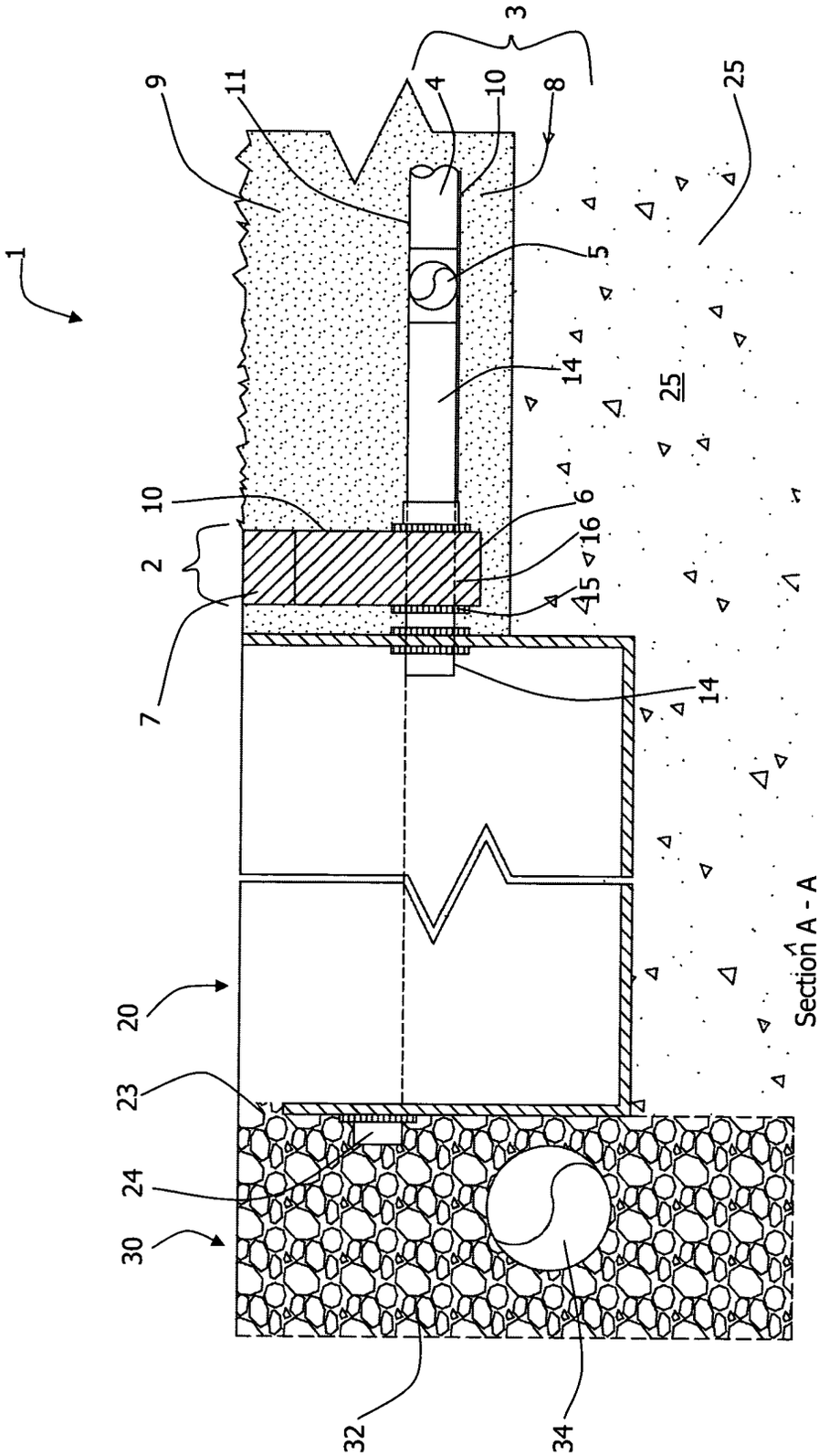

Fig.1

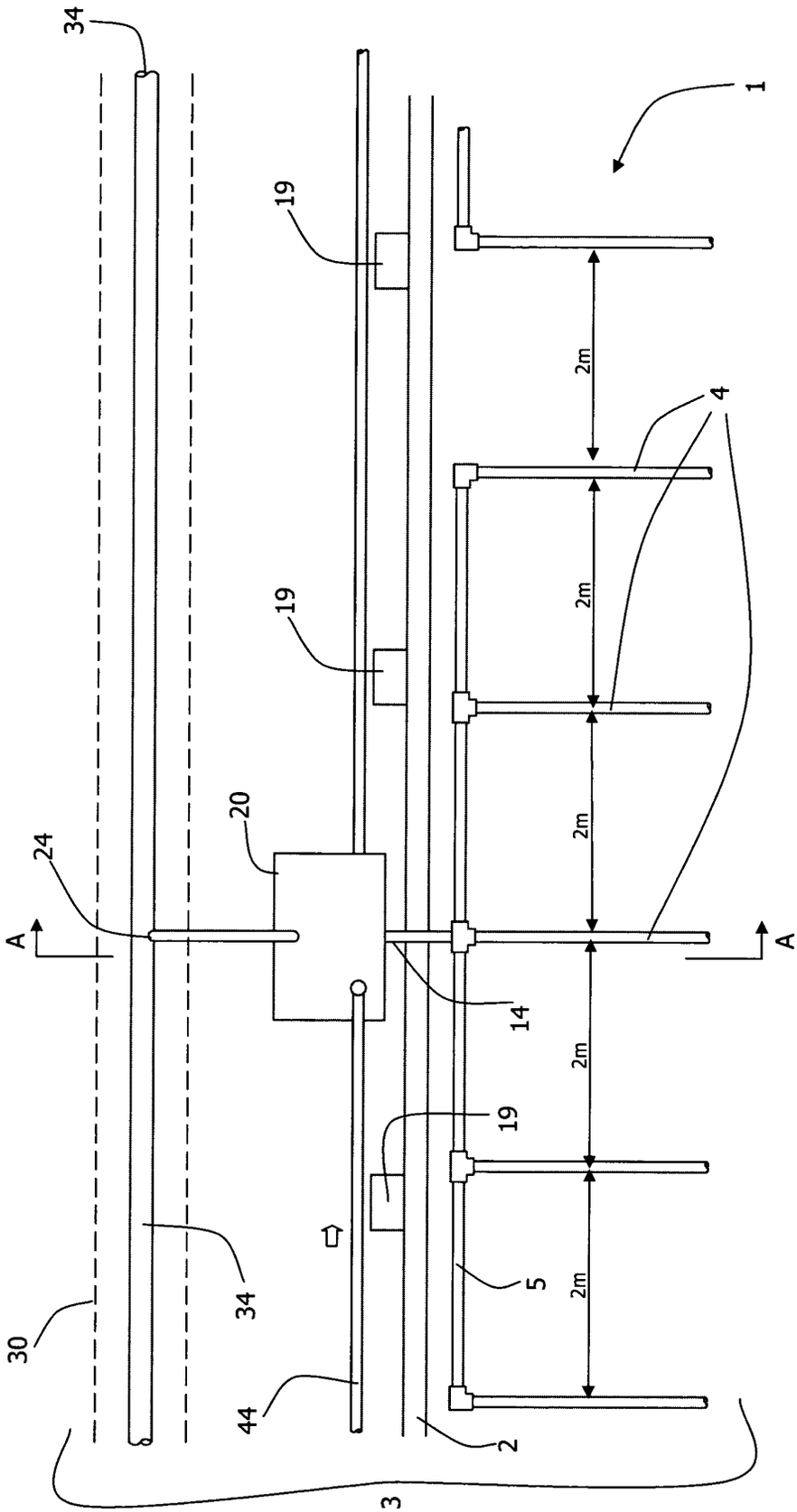

Fig.2

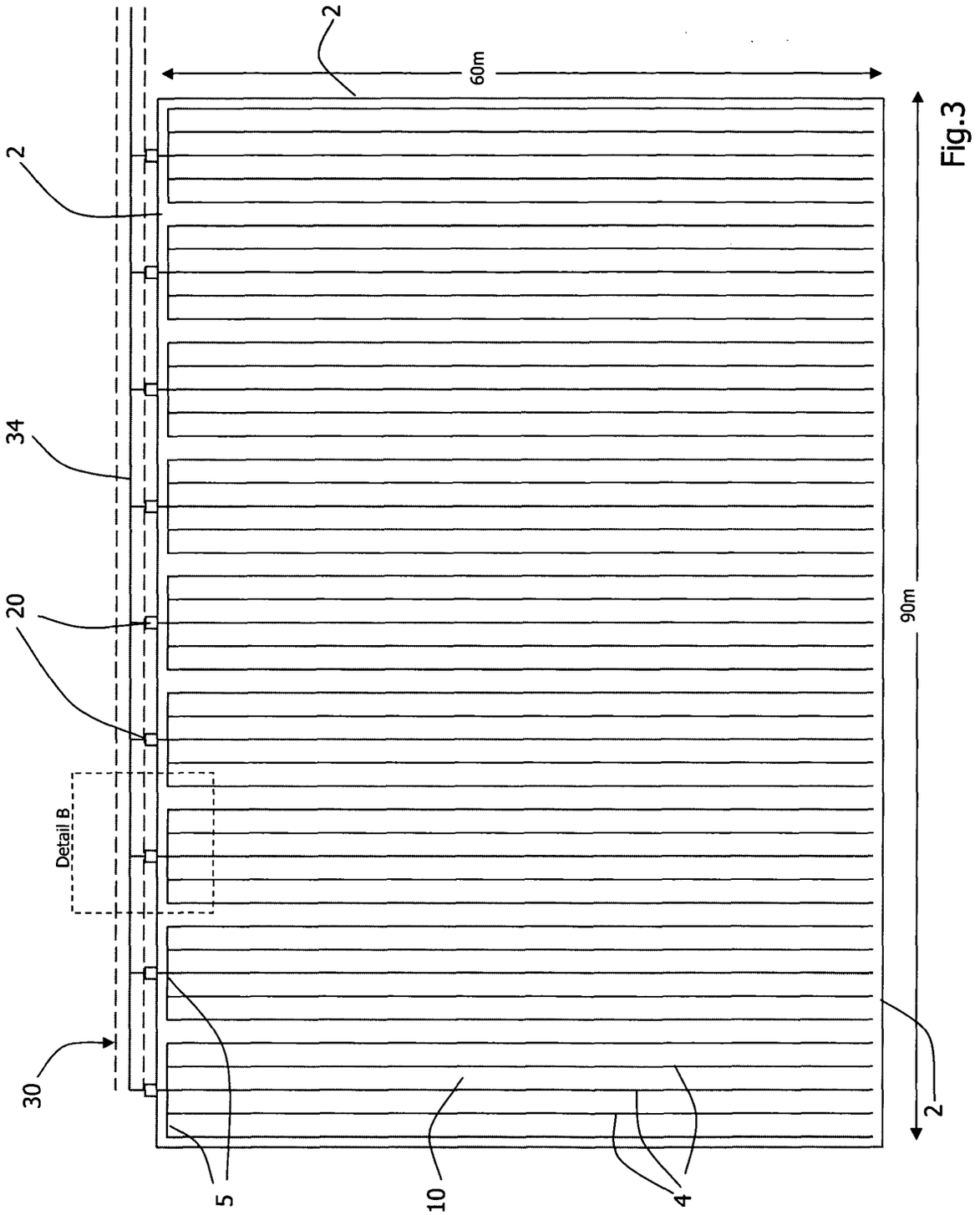

Fig.3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 39 4016

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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